Interrupted Constructions: The Brazilian Health-Industrial Complex in historical perspective

Abstract

Officially launched in 2007, Brazil's Health-Industrial Complex can be seen as an institutional innovation that seeks to simultaneously overcome social inequality in healthcare, dependency on foreign technology and weaknesses in the national innovation and productive structures. Adopting a historical perspective and deploying Celso Furtado's concept of 'marginalisation-modernisation' polarity, the article offers an analysis of how misarticulated social and economic policies hindered earlier efforts to construct a robust domestic health-pharmaceutical sector. To the extent that such polarity persists, interrogating the trajectory of this (indeed, any) high-tech sector cannot be achieved in isolation, but through embedding it in the wider social and economic dynamics that continue to shape Brazil's development. Building on this analysis, the additional argument is made that despite its promise, the rise of the hybrid, neoliberal-developmental state has not succeeded in overcoming the 'marginalisation-modernisation' polarity. Without resolving old ones, it has introduced new inconsistencies between industrial, macroeconomic and social policies that, as in the past, risk hindering the success of this institutional experiment.

Keywords

Health-Industrial Complex, neodevelopmentalism, 'marginalisation-modernisation', Brazil, technological competitiveness

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"Now, more than ever, we are heirs to and responsible for the resumption of an interrupted construction whose name is Brazil and whose inspiring master is Celso Furtado"

Luiz Inácio 'Lula' da Silva, 2004

Calls to resume interrupted constructions are not rare in Brazil, nor is it surprising that President Lula should want to make political capital of Furtado's vision for Brazil while commemorating his death. Regardless of what Lula himself made of Furtado's ideas, amidst the uneasy mix of hopes and disillusionment that accompanied his two terms in office (2003-10), a self-proclaimed *Furtadian* project was indeed in the making: constructing a health-industrial complex in Brazil. Seeking to co-articulate the logic of building a dynamic industrial base, and the logic of providing universal and egalitarian healthcare, the health-industrial complex proposed itself as a means of addressing social inequality, dependency on foreign technology, and weaknesses in the national innovation and productive systems simultaneously, with the ultimate purpose that of helping propel Brazil's socio-economic development forward (Gadelha *et al.*, 2003; Gadelha, 2006). The project of building a Brazilian health-industrial complex was promptly embraced by the Lula administration. It singled out the health-pharmaceutical sector[1] as one of the four sectors of strategic importance in its first industrial policy in 2003, followed by a number of measures in its support, of which the most visible was the creation of the Executive Group of the Health-Industrial Complex by Presidential Decree in May 2008.

Both the nature of the health-industrial complex initiative and its timing are intrinsically linked to socio-economic and political developments in Brazil. From the early 1920 until the new Constitution of 1988, the Brazilian state had presided over a healthcare system characterised by a deeply discriminatory principle that restricted medical coverage, and other social rights, to those in the formal[2] job market, excluding agricultural workers, the unemployed and the informal sector workers, in short, the majority of the population (Elias and Cohn, 2003). The constitutional right to free and universal healthcare (Art. 196) emerged out of a wide social movement for social and political rights in the 1980s that saw universal access to healthcare inextricably linked to the universalisation of social rights and of social security overall. Indeed, in contrast to other countries in the region, the 1988 Constitution can be seen to have laid out the foundations of the welfare state

in Brazil, another construction in the making. In terms of health, the radically changed role of the Brazilian state – now called upon to guarantee free and universal healthcare for 200 million Brazilians through the *Sistema Único de Saúde,* SUS (the Unified Health System) – created the favourable conditions for the Health-Industrial Complex initiative to emerge.

The practical materialisation of the initiative had to await other conditions to mature. Of these, three are worth highlighting. First, the rolling out of what could become one of the largest public healthcare systems in the world soon revealed the weak productive capacities underpinning it. To give a measure of such shortcomings, the trade deficit of the healthcare sector grew from US$2.4 billion in 2003 to just over US$10 billion in 2012, half of which was accounted for by the deficit in the pharmaceutical sector alone (Gadelha *et al.,* 2013). Such trade deficit betrayed the unsustainable reliance on imports and the lack of productive, not to mention innovative, capacities in the domestic health-pharmaceutical sector. Second, its elevation into strategic sector status from 2003 onwards was dependent on the Brazilian state explicitly reclaiming industrial policy as an important element of its efforts to improve Brazil's economic performance, an element that maintained a prominent place in the hybrid neoliberal-developmentalist model of the *Partido dos Trabalhadores* (PT) administrations (Ban, 2013). Third, and related, the kind of 'open economy' industrial policy that characterises this hybrid model is predicated to a considerable degree on the dynamic role knowledge-intensive sectors, such as the health-pharmaceutical one, could play in facilitating the 'competitive insertion' of Brazilian economy into the global economy.

The health-industrial complex is worthy of attention on account of its admirable and ambitious goals. It is also noteworthy because it constitutes an institutional innovation *par excellence* of Brazil's hybrid neodevelopmentalist model whose features stem from its attempts to reconcile monetary orthodoxy and other neoliberal policy prescriptions with state activism not only in the economy, but also in the social realm. This said, an assessment of the success or otherwise of this institutional innovation would be premature at the moment due to the necessarily long-term nature of this undertaking and its timing. The initiative became officially part of Brazil's social and economic agenda only with the launch of the *Mais Saúde* (Better Health) and the Growth Acceleration Programme in 2007. The establishment of the Executive Group of the Health-Industrial Complex by Presidential decree in 2008 was a significant endorsement of this institutional experiment, although support for it, as will become clear, has not been as solid as such high-level

endorsement would suggest. Moreover, one of the most visible elements of the Complex – the Productive Partnerships for Development Programme (PDP) aiming to bring together public laboratories and private domestic pharmaceutical companies with the aim of building productive capacities for the SUS – was only launched in 2009. It captures the aim of the health-industrial complex best, as the partnerships are in principle designed with the aim of reducing the vulnerability of this social policy area and strengthen Brazil's productive and innovative structures (Gadelha *et al.*, 2013). But the guidelines for the PDP partnerships were formalised only in 2012 and the vast majority of the 100 or so partnerships are in their early stages and not open to public scrutiny, once again hindering assessment efforts. Whether this institutional innovation would survive the radical change in government occasioned by the impeachment of President Rousseff in August 2016 remains an open question, and any answers offered to it at this point in time would also be premature.

What can be achieved here and now is a clearer understanding of the origins and nature of the problem that the health-industrial complex (hereafter, CIS[3]) is meant to resolve and what may hinder its chances of success. Adopting a historical perspective that aims to sharpen our understanding of this initiative in light of its earlier manifestations and their subsequent evolution, the aim of this article is to contextualise the institutional innovation that it represents in a series of interrupted and resumed efforts to construct a Brazilian health-pharmaceutical sector. The impossibility of foreseeing CIS's outcomes at this point in time lays even more emphasis on gaining a deeper understanding of the nature of these earlier efforts, analysed in the second section of the article. The main argument is that Brazil did not succeed in constructing a dynamic health-pharmaceutical sector in the past because of the *contradictory* nature and *misarticulated* aims of its technology, industrialisation and social policies. Such contradictory nature, in turn, was the result of Brazil's socio-economic trajectory being conditioned by what Celso Furtado called 'marginalisation-modernisation' polarity. The first section expands on this concept, chosen because by knitting together social, economic, technological and political concerns, it better supports a contextual and historical analysis of the peculiar way in which Brazil's social marginalisation and mode of integration in the global economy shaped the outcomes of earlier efforts to build a domestic high-tech sector like the health-pharmaceutical one.

It is also chosen because it directly inspired the CIS initiative and its aim of addressing technological, industrial and social concerns in an *integrate*d manner (Gadelha, 2003; Gadelha *et al.*, 2013). Compared to earlier efforts that are the focus of this article, it is certainly true that CIS has a rather more ambitious vision,

but despite such ambition and its declared integrative character, it remains only partially articulated *vis-à-vis* other important policies, once again, industrial, social and macroeconomic policies. It is for this reason that attention is paid to the misarticulation between these policies throughout the period covered in the article. Such mode of enquiry offers insights not only on the material structures in which CIS is embedded, but also on the obstacles that may hinder the chances of success of this more recent chapter in the construction of a health-pharmaceutical sector in Brazil. These obstacles stem primarily from the contradictory manner in which fundamental changes in the global economy – articulated domestically more recently through the hybrid, neoliberal-developmentalist state orientation – have generated new inconsistencies amongst these policies without necessarily resolving old ones. Of the fundamental changes occurring in the global economy from the late 1970s onwards, the concomitant rise of neoliberalism and financialisation are particularly relevant. These are complex developments that cannot be adequately addressed in an article, and certainly not in an article whose focus is elsewhere. For this reason, the discussion offered in the third section limits itself to highlighting the challenges that the contradictory manner in which these trends materialised in Brazil pose to the CIS initiative. In particular, and despite significant recent improvements, these challenges point to the difficulties of Brazil's neodevelopmental model in reversing the reproduction of the 'marginalisation-modernisation' polarity. Building on this analysis, the article makes the additional argument that as long as this polarity is reproduced, it is not only the success of a neodevelopmental institutional innovation like CIS that is at risk, but also – indeed, primarily – the achievement of the main goal of the neodevelopmentalist state itself: sustainable economic growth with social equity.

1. The 'marginalisation-modernisation' nexus and technological progress

Turning to the 'marginalisation-modernisation' nexus as developed by Celso Furtado is as important for understanding Brazil's socio-economic trajectory overall as that of specific high-tech sectors like the health-pharmaceutical one. This may not appear as a necessary move, for, barring neoclassical economic accounts that see advances in technology as exogenous to economy and society, other accounts that consider the social, economic and technological order as mutually constituted exist. Amongst these, evolutionary economic theory – with notable contributions by Christopher Freeman (1974), Richard Nelson (1988) and Bengt-Åke Lundvall (1992) – has provided significant insights into the relation between technological progress and economic growth in developed and developing countries alike. Work along these lines on national innovation systems has repeatedly highlighted the centrality of technological progress in shaping socio-economic development patterns and, importantly, the social, cultural, institutional and political determinants of innovation capacity. In Latin America itself, the *re*cognition of the mutual ordering of the social and technological order and of the significance of innovation and long-term technological competitiveness in resolving the socio-economic problems of the region took the form of neostructuralism under the auspices of ECLAC/CEPAL from the early 1990s onwards.[4] This influential paradigm would go on to provide an attractive alternative developmental model for Latin America's 'post-neoliberal turn' of the 2000s (Leiva, 2008; Yates and Bakker, 2014). Brazil's neodevelopmentalist state orientation from 2003 onwards mirrored to a considerable degree the neostructuralist turn, placing (at least in principle) social equity and cohesion not only at the core of social policies, but, as the CIS initiative demonstrates, also of economic, innovation and international competitiveness ones (ECLAC, 2007).

Why, then, turn to Furtado's discussion of technological progress and development when a neostructuralist or evolutionary economic approach would do? At least four reasons can be offered. First of all, because it was precisely some of Furtado's insights on the close relationship between technological advancement and the socio-economic context that inspired the CIS initiative itself (Gadelha, 2003 and 2006; Gadelha *et al.*, 2013). Second, because many of these insights generated from Furtado's *oeuvre* resonate strongly with those offered by evolutionary theorists on the social, economic and political determinants of innovation capacity and technological progress (Albuquerque, 2007). Third, because compared to the evolutionary theorists and

others of different persuasions, Furtado had an understanding of Brazil's social, economic and political realities that remains unparalleled. And, fourth, because despite the promise of the neostructuralist turn to place social equity at the core of both social and economic policies, in its drive to achieve the competitive insertion of the region in the global economy it neglected taking fully into account the asymmetric power relations that characterise both the regional and the global economy (Leiva, 2008).

Furtado's discussion of technological progress, nested within the 'modernisation-marginalisation' polarity, not only does not suffer from a lack of attention to power relations, but it also supports a deeper probing of the specific conditions that have hindered Brazil's efforts to construct dynamic and competitive productive sectors, including the health-pharmaceutical one. For Furtado, technological progress – the only vector for effecting changes in *productive* and *social* structures – implied the development of indigenous dynamic productive centres and of a 'relative technological autonomy' as necessary preconditions for overcoming Brazil's social and economic underdevelopment. Importantly, autonomy did not mean or imply autarky. Indeed, as evolutionary theories would argue later (e.g. Nelson and Pack, 1999), it necessitated considerable efforts to assimilate and adapt existing (i.e. foreign) technologies as the first step towards a shift from technological dependence to technological *inter*dependence (Albuquerque, 2007). Such technological progress was always closely linked to broader economic, social and political concerns and meant at the very least adopting and developing technologies that were in line with the society's needs, country's factor endowment, as well as its productive capacities (Furtado, 1968; 2003).

Brazil's technological progress for Furtado was intrinsically linked to the 'modernisation-marginalisation' polarity that he considered key to explaining Brazil's development trajectory. Although Brazil would industrialise fast from the 1930s onwards, the persistence of the 'marginalisation-modernisation' polarity meant that this period was one of 'growth without development' (Furtado, 1987; 1997). This was so because one of the most important determinants of Brazil's industrialisation trajectory was the manner in which foreign capital and the surplus from commodity exports would be channeled towards a kind of industrialisation that satisfied the demand created by a small elite where wealth was concentrated and whose consumption patterns were similar to elites in frontier economies (Furtado, 1997; Grinberg, 2013). As technological innovation in the latter generated an ever-expanding range of goods and the demand profile of elites in Brazil diversified accordingly, the industrialisation process, and the technology adopted, was geared

primarily towards its satisfaction without regard to the society's needs or productive capacities (Furtado, 1987).

In other words, the changing pattern of demand by a minority group generated the incentives for the creation and upgrading of the consumer goods industry within the parameters of protection offered during import substitution industrialisation which, over time, moved towards (partially) replacing import subsidies for capital goods with their domestic production. However, the capital-intensive technologies adopted in both consumer and capital goods industries not only did little to resolve under/unemployment and informality, but exacerbated them, reinforcing the economic and social exclusion of large parts of the population from the fruits of economic growth. As a result of these dynamics, a relatively small part of Brazil's economic and social structures modernised while the rest did not. The modernisation of social and economic structures thus remained superficial, 'a showcase modernity' (Fajnzylber, 1983) where consumption patterns of a minority converged with those in frontier economies but the institutional, social and technological structures did not. Moreover, such superficial modernisation and startling socio-economic marginalisation hampered the growth of a strong, integrated domestic market and of domestic savings/investment, thus perpetuating two enduring and debilitating features of Brazil's political economy: income concentration and external indebtedness (Furtado, 1997; 2003).

It will be said that Brazil did industrialise and that by 1980 it had become part of the ten largest industrial economies in the world. It is true that Brazil's economic performance during the 1950-1980 period was impressive, growing at an average of nearly 7% p.a., compared to the 5% global annual average (Palma, 2012). Nevertheless, this high economic performance was a case of 'unaimed opulence' (Drèze and Sen, 1989), a tremendous wasted opportunity to break the 'modernisation-marginalisation' polarity and achieve socio-economic development that benefitted the society as a whole. Not only did the historically high income concentration not improve as the economy was growing, but it actually worsened (Lamounier, 1989: 134). Growth without development, as Furtado often argued, perpetuated income concentration and high levels of socio-economic marginalisation. There could be no genuine technological progress in Brazil as long as blatant marginalisation and glaring income inequalities persisted. The persistence of the 'marginalisation-modernisation' polarity was not only antisocial, but it also undermined Brazil's chances of sustainable economic growth, as its subsequent economic trajectory would demonstrate. While by 1980 Brazil had an

industrial base accounting for nearly 44% of the GDP, the application of technology varied considerably, high-tech sectors accounted for only a relatively small share of manufactures and, as the ensuing liberalisation reforms would reveal, were generally unable to compete with the Asian 'tigers' that had maintained low levels of income inequality and co-articulated industrial, technological and macroeconomic polices (Rodriguez, 2008; Feijó and Lamonica, 2010; Palma, 2012). Certainly, successful cases of high-tech sectors existed in Brazil, notably, in aeronautics (Embraer), petrochemicals (Petrobrás) and agricultural research (Embrapa) (Evans, 1995). Their success indicated that technological successes was possible, but their localised nature also indicated that overall technological progress was not possible without breaking the structural impediment that the 'marginalisation-modernisation' polarity represented (Albuquerque, 2007).

It can be safely assumed that achieving relative technological autonomy and addressing the marginalisation of the majority of Brazil's population was not a priority during the most intense period of industrialisation in Brazil (1950-1980) (Furtado, 1992). This can be observed primarily in the paucity of measures taken to counteract the persistent and growing marginalisation and inequality. Importantly, it is also clear in the conscious handing over of the most dynamic sectors of the economy to foreign capital. For our purposes, one of the most problematic aspects of this dependency on foreign investment was the lack of control over technology. Having invested primarily to enter the domestic market, foreign companies were not particularly innovative and did not invest in R&D in Brazil, thereby reducing the technological dynamism that could have been achieved otherwise (Kohli, 2004; Grinberg, 2013). The contradictory consequences of the reproduction of the 'marginalisation-modernisation' nexus during this period can be summarised thus: a growing industrial base employed a relatively small proportion of the population while generating reasonable GDP growth rates that benefitted a small minority, not least foreign investors who controlled large parts of the most dynamic sectors of the economy but without engaging in research activities.

What is especially useful in Furtado's analysis of 'marginalisation-modernisation' polarity for the purpose of this article is his observation that the development of a specific high-tech sector like the health-pharmaceutical one, could not be achieved, sustained or studied in isolation. A narrow focus on sectoral or innovation policies would simply not do. Importantly, the development of any high-tech sector could not be achieved, sustained or studied without reference to the *social*. Echoing what later social studies of technology[5] and evolutionary theory would refer to as the mutual shaping of the societal and technological

order, it points to the fact that no industrialisation or innovation policy, no matter how advanced, could ensure technological progress if undertaken without regard for Brazil's most pressing social problems, namely grotesque inequality and socio-economic marginalisation. In the case of Brazil at least, 'it is the *social*, stupid!' obtained, for the elimination of socio-economic marginalisation was the key prerequisite for making the domestic market the dynamic centre of economic growth and for directing, stimulating and supporting its own productive and innovative activities towards meeting the needs of the society as a whole. As long as these were determined by the priorities of a small group where wealth was concentrated, the 'marginalisation-modernisation' polarity would not only persist, but it would also be reproduced in increasingly more complex forms. Being caught in this dynamic, whatever sectoral technological progress was achieved – as in the cases mentioned above - would remain localised and incapable of generating the necessary forward and backward linkages needed for creating and sustaining technological advancement.

Not only the fate of high-tech sectors, but the broader development trajectory itself would remain conditioned by the 'marginalisation-modernisation' polarity, a conditioning that manifested itself, amongst other things, in macroeconomic, technological, industrial and social policies pulling and pushing in various and often conflicting directions. As will be seen shortly, it is in these inconsistencies and contradictions that the immediate reasons for the failure of earlier efforts to build a dynamic health-pharmaceutical sector are to be found. It is also here that the reasons for the emergence of the CIS initiative are located. As noted earlier, inspired in part by Furtado's insights, CIS was proposed as a means of rectifying social inequality (in health), dependency on foreign technology and weaknesses in Brazil's innovation and productive structures in an integrated and coordinated manner, and contribute to propelling Brazil's socio-economic development forward. These aims were in line with those of the emergent neodevelopmental state orientation in Brazil that promised to bring about a significant transformation of socio-economic structures by placing the *social* at its core and reversing the 'modernisation-marginalisation' polarity (PT, 2002). But, as will be discussed in the final part, the contradictions inherent in the hybrid model that took shape from 2003 onwards did not overcome the 'marginalisation-modernisation' polarity or propelled Brazil towards sustainable socio-economic development. As discussed in detail in that section, it is in this challenging and contradictory context that the success of the CIS institutional experiment largely depends. But such challenging context is as much the outcome of the hybrid neodevelopmentalist orientation as of the misarticulated and contradictory nature of macroeconomic, technological, industrial and social policies that preceded it, to which we turn next.

2. Leaps and retreats: constructing a national health-pharmaceutical sector

a. The 'miraculous' growth period (1945-1980)

This period of impressive economic growth in Brazil was accompanied by a 'conservative-informal' welfare regime, whose aim was not the reduction of income inequality or of socio-economic marginalisation, but the selective improvement of living conditions for those groups with the strongest potential to organise politically - i.e. the formally employed – while the marginalised majority relied on a mixture of familial, philanthropic and meager public care (Fleury, 2014; Leubolt, 2014). The healthcare provisions remained largely unchanged from the early 1930s until the 1988 Constitution, providing services to the formally employed mostly through the private healthcare sector that expanded from the mid-1960s onwards, and based on a dual private-public financing system (Elias and Cohn, 2003). In other words, the healthcare system up until 1988 was part of, and helped reproduce, Brazil's 'marginalisation-modernisation' polarity. The socio-economic exclusionary nature of economic growth during this period meant that, had a domestic health-pharmaceutical sector successfully emerged, it would have mainly improved Brazil's *industrial* fortunes. Indeed, the general view prevailing at the time was that when developing countries had been successful in building a domestic pharmaceutical sector, this industrial success had often come at the expense of improved healthcare (WHO, 1988). However, Brazil appears to have sacrificed *both*: the majority enjoyed no healthcare to speak of and although a health-pharmaceutical sector did exist in Brazil, this was not a dynamic, domestic one.

The weakness of the domestic pharmaceutical sector was the outcome of the short-term and ill-defined developmentalism that stemmed from the dynamics of the 'marginalisation-modernisation' polarity and resulted in misarticulated social, technology and industrial policies. Whereas universal and comprehensive access to healthcare was not an objective of social policies during this time, access to technology and industrialisation were important goals, even if they were misarticulated. As regards technology, for instance, an important goal of excluding pharmaceutical and foodstuff product patents in the 1945 patent law was that of promoting the growth of these sectors in Brazil, a move followed by the complete elimination of patents for pharmaceuticals (products and processes) as part of an extensive list of exclusions from patentability in

1971 (Mazzoleni and Póvoa, 2009). These were not radical measures, for the international patent law at the time allowed them, but they provide evidence of Brazilian state's drive to accelerate industrialisation in general and of the pharmaceutical sector in particular. However, there was no co-articulation of these changes to the patent law with broader industrialisation strategies, and certainly not with whatever social policies existed. Industrialisation strategies, being caught in the dynamics of Furtado's 'marginalisation-modernisation' polarity, had the opposite effect in the pharmaceutical sector, resulting in its weakening by the end of the 'miraculous' growth period.

An existing sector populated by many small firms and a few rather excellent research institutes was forced during WWII to both expand the share of the market, and reduce its dependency on imported active pharmaceutical ingredients (API). Despite such growth, the productive and innovative capacities of this sector remained rather weak, a concern that led to changes in the patent law mentioned above (Mazzoleni and Póvoa, 2009). Importantly, the short-termism that characterised policies during this period resulted not in the strengthening but in the de-nationalisation of the domestic pharmaceutical sector since early on, starting in the 1950s and accelerating further during the 1970s, with most FDI flows in the sector directed at buying national firms as a way of establishing a base in the Brazilian market (Evans 1979; Gereffi 1983). The industrialisation policy itself offered strong incentives to multinational pharmaceutical to establish a subsidiary in Brazil. Instruction 113 aimed at equipment importation with a view to technological upgrading put domestic pharmaceutical firms at a disadvantage *vis-à-vis* foreign ones. The 'law of similars', part of the import licensing system used to limit non-essential import, also provided incentives to foreign pharmaceutical companies to establish subsidiaries in Brazil because many drugs and/or APIs were not produced domestically and, being deemed essential, their importation or production was not strictly limited (Mazzoleni and Póvoa, 2009). As a result of these misarticulated policies, and contradicting the orthodox view that FDI flows would be weak in high-tech sectors where no patent protection exist, FDI flows in the Brazilian pharmaceutical sectors increased the weaker patent protection became. Indeed, the share of foreign control in the health-pharmaceutical sector increased from 13.5% in 1930 to 62% in 1960 and nearly 80% in 1969 (Ackerman, 1971: 21). The increase in FDI flows in the sector from US$113 million in 1971 to US$646 million in 1979 – more rapid than in other sectors of the economy – sealed its control by foreign pharmaceutical companies by the end of that decade (Gereffi, 1983).

These developments had two substantial and perverse effects: the marginalisation of Brazilian pharmaceutical companies – both in size and in their focus on areas of no major interest to multinational firms – and the dampening of dynamism and R&D efforts in the sector. This is important because, contradicting another orthodox assumption about the automatic benefits of FDI on technological upgrading, the domination of this sector by foreign companies did not make it more innovative. On the contrary, some remaining domestic firms were more likely to introduce innovations than foreign-owned ones, who were primarily focused on producing formulations and distributing imported drugs, and, in a handful of cases, on producing API (Evans, 1979). Such performance was in stark contrast to India, where similar changes to patent law in 1970 were accompanied by a number of policies, e.g. restrictions on foreign ownership, discriminatory use of government procurement and fiscal incentives, to support what would become an internationally-competitive domestic pharmaceutical sector by the 1990s.

Not only were foreign pharmaceutical companies not carrying out R&D in Brazil, but they also played an important role in frustrating a precursor to the current health-industrial complex in the 1970s: the central pharmaceutical agency, CEME (*Central de Medicamentos*) (Mazzoleni and Póvoa, 2009). Created in 1971, CEME went through a number of often-confused institutional and legal transformations, but its aims of promoting the domestic production of affordable essential medicines, financing and coordinating R&D structures in the sector and reducing dependency on foreign API/drugs remained more or less central to its operations. In light of misarticulated policies that effectively promoted foreign ownership in the sector, it was not surprising that, despite some successes, CEME's financial and political autonomy to effectively manage investments in technology and productive structures was gradually reduced. By the mid 1980s its industrial arm was dismantled and in 1997 CEME was completely abolished (Fernandes, 2004). The 'miraculous' period ended with no healthcare system to match its economic record; as for the the indigenous pharmaceutical sector, the 'miraculous' economic growth had left it in a rather weak position, but even harder times were in store.

b. The 'lost' decades (1982 – 2002)

Much has been said about how the debt crisis worsened the fortunes of catch-up economies that, like Brazil, had relied extensively on external debt to fund their industrialisation. The current euphemism 'emerging power' helps obfuscate not only the substantial retrograde steps caused by the degradation of Brazil's socio-economic structures during the 1980s and 1990s, but also the degree to which its weakened position attenuated its chances of participating meaningfully in the new global economy that was in the making. This was the outcome not only of the unraveling of Brazil's economic successes during this period, but also of active strategies on the part of frontier economies, especially the US. In particular, the twin rise of neoliberalism and financial liberalisation in the US during the 1980s pushed Brazil's chances of participating in the emerging high-tech, knowledge economy further out of reach. This was so because the tightening of monetary policy and the rise of interest rates in 1980-1 that would provoke Brazil's economic plunge, not only did not affect US position as a frontier economy, but strengthened it. Notably, the already substantial federal R&D levels were more or less maintained through the floating of massive issues of Treasury bonds and other forms of government debt during the 1980s. The aim of such spending was as much geopolitical as it was the strengthening of US' technological base and competitiveness *vis-à-vis* other countries, an aim that was achieved (Cimoli *et al.*, 2008; Weiss, 2014). But Brazil, and other countries affected by the debt crisis, not only could not borrow to support their R&D levels, but also had to channel increasingly larger domestic resources to service the existing debt. Besides, the concomitant rise of neoliberalism and international financial liberalisation measures during that period also gave rise to a new 'wisdom' that simultaneously legitimised the apparent necessity of state withdrawal from the economy in general and innovation-related investment in particular in much of the developing countries – but not in the US – and opened the way for the rise of international financial capital flows whose short-term and largely speculative/rentier nature would further undermine the efforts of countries like Brazil to move up the technological ladder.

These developments were unfolding at a time when a consensus of sorts was emerging in Brazil towards a new strategy capable of generating growth in the changed global economy. The first civilian government in 1986 reflected this consensus by acknowledging that the new growth strategy had to be based on a general increase in competitiveness and transformation to a more *technologically-intensive* pattern of industrialisation (Pedersen, 2008). Nonetheless, despite the numerous programmes and fiscal incentives

announced to strengthen the technological competitiveness of Brazilian industry during the late 1980s and 1990s – e.g. the new industrial policy *Development and Competitiveness* (1998) and the *Avança Brasil* plan (2000-3) – no substantial industrial policy instruments were implemented (ibid.). This can be explained in large part by the fact that Brazil's strategy of 'competitive insertion' was based on the assumptions that (a) the opening of the economy and FDI flows were the best way to achieve such insertion, and (b) that technology, innovation and knowledge, like any commodity, could be acquired under market conditions (Coutinho, 2003).

These assumptions were completely at odds with the aggressive strategies of transnational high-tech companies to protect their strategic assets: knowledge and technology. The most radical means through which this was achieved was the 1994 WTO TRIPS Agreement – initiated in the mid-1980s as the US' insistence – that mandated high and binding intellectual property protection standards in all its signatories regardless of the different social, economic and cultural conditions prevailing in them. Being an extension of developed countries' industrial policies, TRIPS was a means to protect their competitive advantage in high-tech sectors, including pharmaceuticals, in the emergent global knowledge economy (May, 2000; Cimoli *et al.* 2008). Since signing up to TRIPS in the mid-1990s, Brazil's already weakly articulated technological learning networks would disintegrate further precisely at a time when developed countries were aggressively protecting the assets of their high-tech sectors.

Besides having to operate in this unequal playing field, Brazil's chances of sustained technological advancement during the 1990s worsened further, firstly, because the necessary funds were channeled instead towards growing debt interest repayments; secondly, on account of the new wisdom that state interference in markets was inefficient and, thirdly, due to the unfavourable investment environment that resulted from successive governments' orthodox monetary policies. Of the latter, the most important were the high interest rate and the accompanying short-term/speculative nature of financial flows that came to dominate Brazil's financial sector and perpetuated its current-account deficit (Rocha, 2002). Inflation was eventually brought under control, but high interest rates and a continuous flow of speculative capital remained at odds with the kind of financing required to build innovative and dynamic productive capabilities: stable and rather long-term investment and engagement with the innovative and technological learning processes in the real economy (Coutinho, 2003). Indeed, the unfavourable macroeconomic environment not only made investment

in technology much riskier for domestic companies, but a process of de-learning also took place whereby, with few exceptions, innovative efforts declined, existing innovative networks were disarticulated and collaborative technological arrangements with foreign companies decreased (Lastres *et al.*, 2003).

These problems were exacerbated further by the disarticulation of whatever little there remained of industrial policies in practice from the patent system. This disarticulation is especially visible in the emergence of the new patent law in Brazil in 1996,[6] which would have negative consequences for the already weak domestic pharmaceutical sector. Not only did the new patent law not take advantage of the meager concessions developing countries had secured during the TRIPS negotiations, but it also introduced obligations not included in TRIPS. The clearest example of the former was the hasty enactment of the law itself, for Brazil had until 2005 to bring its *pharmaceutical* patent rules in line with TRIPS.[7] Others can be added, such as the absence of early working provisions for generics, the weakening of pre-grant opposition, the prohibition of parallel imports and so on (Flynn, 2013; Shadlen, 2016). In addition to strengthening considerably the rights of foreign pharmaceutical patent-holders (which was the aim of TRIPS), the new patent law went beyond TRIPS. Perhaps the most important 'TRIPS+' measure in the area of pharmaceuticals was the 'pipeline' patent protection,[8] one of the very few requests (US and European) pharmaceutical companies did not achieve through TRIPS. The so-called 'local working' requirements[9] – a remnant of the previous link between patent and technological upgrading – were retained, but they were effectively toothless.

As a result of the continued misarticulation between the macroeconomic, industrial and patent policies, a less than robust domestic pharmaceutical sector became even weaker during this period. The elimination of trade barriers and reduction of import tariffs meant that between 1990 and 2000 the (already high) imports of active pharmaceutical ingredients (API) doubled and those of finished products increased six-fold (Mazzoleni and Póvoa, 2009). Moreover, in the unfavourable macroeconomic environment of the 1990s, domestic firms that survived were thrown into greater difficulties by the grant of patents on new drugs. It has been estimated that no less than 340 new drugs would not have been patented in Brazil but for 'pipeline' protection alone (Sweet, 2013: 34). Other policies also worked against them: changes in the rules of public procurement in the 1990s that prioritised price meant that drug procurement pushed many local companies out of this important section of the market. As a result, only one among the top 20 pharmaceutical companies in Brazil during the mid-1990s was nationally owned (Caliari and Ruiz, 2014).

Emerging or established high-tech sectors were particularly hard-hit by the disintegration of Brazil's economic structures, namely, their de-industrialisation, de-nationalisation and downward technological intensity during the 1990s. As noted, the economic reforms undertaken during this period were based on the assumption that the free entry of transnational capital was the key tool for restoring investment rates and technological upgrading (Rocha, 2002; Leiva, 2008). But, as the concomitant rise of neoliberalism and financialisation were transforming global economic structures, neither a technologically-intensive pattern of industrialisation, nor the 'competitive insertion' of Brazil in the global economy occurred. On the contrary, the share of industry fell as low as 27% of the GDP by the late 1990s (Pedersen, 2008), overall investment remained low, and the share of high-tech manufactures – representing only 7.9% of Brazil's total merchandise exports in 2004 compared to a 29% world average (Rodriguez, 2008: 25) – betrayed a return to a comparative advantage based mainly on natural resources and manufactures based on them.

It is indicative of the radical disintegration of patent, industrial, macroeconomic and social policies during this period – never having been co-articulated in the first place – that the weakening of the health-pharmaceutical sector would occur at the same time as the 1988 Constitution laid the foundations of a universal healthcare system. Having been one of the most organised social movements that led to the overthrow of the military regime and to the new Constitution, the *movimento sanitário* (healthcare movement) achieved perhaps the most radical institutional rupture in Brazil's social policy design (Fleury, 2014). Nonetheless, the 'deadly triad' of neoliberal monetary policy during the 1990s contributed to the de-universalisation of healthcare and other social rights in practice. It is notable that although social spending grew during the 1990s, its growth was woefully inadequate to support the universal social security rights guaranteed by the Constitution. Indeed, social policy during the Cardoso era (1995-2002) was one of 'inclusive liberalism' whereby various (conditional cash transfer) programmes targeting the poorest effectively sabotaged the achievement of universal social rights guaranteed by the Constitution, including that of health (Fleury, 2014; Leubolt, 2014).

As a matter of fact, the public healthcare system was underfunded since the start, as the (30%) share of social security budget dedicated to it never fully materialised. Around 20% of the total security budget, formally isolated from the fiscal budget, was regularly siphoned off towards ever-rising debt repayments and only

about one-third of a tax on financial transactions introduced in 1996 to deal specifically with chronic underfunding in the healthcare sector was actually used for this purpose (Viana and Silva, 2015). The general orientation towards macroeconomic stability and state downsizing resulted in (total) public spending on healthcare falling from a low 16.5% of total social expenditure in 1990 to 15.2% in 2005 (Leubolt, 2014: 9). Indicative of the persistence of marginalisation in healthcare, *private* expenditure remained above 55% of total expenditure, making Brazil the only country with a universal healthcare system where private expenditure was well above the maximum level of 30% (Gadelha *et al.*, 2013; Viana and Silva, 2015). Clearly, supporting the nascent *universal* healthcare system was not a political priority during this period.

The misarticulation of patent, technology, macroeconomic and social policies negatively affected the performance of the domestic health-pharmaceutical sector, plunging it by the mid-1990s in the weakest position it had even been since its emergence in the beginning of the century. Importantly, the formal inclusion of the excluded majority and the incipient welfare state laid out in the 1988 Constitution did not undo the 'marginalisation-modernisation' polarity. It could not have done so in such a short period even if there had been political will, and there was precious little will to address the marginalisation of the majority during this period. As a result, structural social heterogeneity became more complex, income concentration did not notably change and targeted programmes towards the poorest contributed to the de-universalisation of social rights in practice, including that of health. Observing the worsening of the 'marginalisation-modernisation' polarity caused by the disintegration of social and economic structures during this period, Furtado lamented that the distance between what Brazil was and what it was expected to be had never been greater (Furtado, 1999: 26). It was in this context that the CIS initiative emerged, but the break represented by the rise of the neodevelopmental model in 2003 did not radically alter the tendencies that had created and perpetuated the problems it was meant to address.

3. The rise of the hybrid, neoliberal-developmentalist state: new and old challenges for the health-pharmaceutical sector

The platform on which the PT was elected promised an alternative development model that would place the social at its core and reverse the 'modernisation-marginalisation' polarity. Such transformation of socio-economic structures was to be achieved through universal social policies, redistribution of income, growth of the domestic market, increased savings and investment rates, massive public investment and land reform (PT, 2002). When one of the PT's strategists argued that there was no historical precedent of a transition from a conservative modernisation tied to financial capital to a productive model of growth and social inclusion (Tarso Genro, quoted in Rocha, 2007: 8), more than stating a fact, he was foreshadowing the degree to which financialisation and neoliberal monetary orthodoxy would remain central in the neodevelopmentalist state orientation from 2003 onwards. Although many inside and outside Brazil welcomed the new administration's simultaneous emphasis on social and industrial policies, the contradictions and limitations of pursuing these policies in the context of an unwavering commitment to macroeconomic orthodoxy soon became clear. The continued commitment to high primary budget surpluses, an inflation-targeting regime, and a floating exchange rate, only helped to perpetuate the transfer of resources away from the productive and social sectors towards the financial sector, a trend set in train during the earlier decade. The degree to which the Brazilian economy became an international platform for international financial valorisation can be grasped by the fact that Brazilian stock market (Bovespa) grew by 523% between 2002 and 2010 – outperforming every other bourse in the world – and the ratio of financial assets over productive assets reached nearly 75%, up from 15% in 1992 (Paulani, 2010: 369; Anderson, 2011). To put these trends in comparative terms, around 8.1% of the GDP was handed out to domestic and foreign creditors as debt repayments in 2005, compared to a modest 3.3% of the GDP on public healthcare expenditure, and a dismal 0.3% of GDP towards the flagship *Bolsa Família* programme (Rocha, 2007: 12; Gadelha *et al.*, 2013: 1616). Despite the declared focus on growth with equity and social inclusion, spending priorities told another story.

As far as productive structures and innovation were concerned, the continued commitment to neoliberal macroeconomic prescriptions created a 'deadly triad' of overvalued exchange rates, high interest rates and very low levels of public investment that helped unleashed not the Schumpeterian instinct amongst market players, but rather the predatory-rentier one. Public investment by a 'sterilised' government never reached

above 3% of the GDP and private investment did not fill the gap. Despite (or because of) high financial flows, total investment as percentage of GDP from 2000 onwards was around 17-18%, poor even compared to a relatively inadequate historical record, and much lower than in other 'emerging' countries like India and China (Palma, 2012). Notwithstanding the fact that numerable measures – e.g. the creation of the National Council for Industrial Development and the Brazilian Industrial Development Agency in 2004, and all the major industrial policies articulated since 2003 (PITCE, PDP and the *Brasil Maior* Plan) – emphasised the importance of industrialisation, technological innovation and 'genuine competitiveness', most indicators show neither deepening industrialisation, nor technological progress. During the 2004-2010 period, even as GDP grew at an average 4.5% p.a., investment rates remained low, imports grew faster than exports, and the manufacturing share continued to fall. In 2011, the manufacturing share of GDP was 14.5% – a level similar to that in 1956 – whereas the share of high-tech manufacturing represented only 7% of Brazil's total merchandise exports, compared to 35% for China (Palma, 2012). By the end of that decade, it was clear that accumulation had shifted from manufacturing to the financial sector and natural resource extraction/production (Rocha, 2007; Anderson, 2011; Feijó and Lamonica, 2010).

Hence, despite the renewed attention during this period to industrial, technology and innovation policies, they continued to be at odds with macroeconomic policies. And, despite its commitment to 'growth with equity', they also remained misarticulated *vis-à-vis* social policies. It is true that a number of social policies of the neodevelopmentalist state did bring significant and positive changes to Brazil's socio-economic profile during this period. Amongst them, the most important have been the continued rise of the (real) minimum wage, the reduction of wage inequality and the rise of income of the poorest, especially via targeted social programmes such as *Bolsa Família*. Together, they set off a sustained rise in popular consumption, accompanied by improved social indicators for which the Brazilian neodevelopmental model is known: reduction in poverty levels and a sustained reduction in the Gini coefficient for the first time in decades. Notwithstanding these remarkable achievements, the 'modernisation-marginalisation' polarity was not overcome. Indeed, as the first decade was closing, income inequality remained extremely high: in 2007, the income shares of the poorest and richest 10% were 0.9% and 44%, respectively (Barros *et al.*, 2010: 134).

It is precisely because income remains so strongly concentrated in Brazil that some improvements in the distributional profile led to massive changes in the demand structure. However, as noted above, this increased

demand for goods was largely met by imports – as illustrated by the growth of penetration of imports in all industrial markets (Nassif *et al.*, 2013), including the health-pharmaceutical one – and did not result in the deepening of domestic productive structures or significant technological upgrading. Moreover, admirable improvements in social indicators should not obfuscate the tendency of social spending to reinforce in some respects the de-universalisation of social rights that was put in train during the previous decade. For instance, although federal social spending increased from 12.6% to 15.8% of the GDP between 2000 and 2009, nearly half of it was claimed by social insurance (pensions), as had happened during the 1990s, thus perpetuating the underfunding that had characterised healthcare earlier on (Leubolt, 2014: 14). The abandonment of the constitutional principle of social security integrality was not reversed during this period; indeed, the strong expansion of *private* social services and the continued preference for conditional cash transfers targeting the poorest continued to compromise the constitutional universality of social rights (Fleury, 2014).

Thus, the contradictions between a neoliberal monetary policy and neodevelopmental industrial and social policies led not to the restoration of the domestic market as the dynamic sector of the economy, to the stimulation of productive and innovative activities towards meeting the needs of the society, or to the substantial reversal of income concentration as Furtado had insisted all along. Rather, they led predominantly to a process of re-commoditisation and financialisation that generated some positive socio-economic indicators, without decisively overcoming Brazil's vulnerability to external shocks or its 'marginalisation-modernisation' polarity. These persisting tendencies in Brazil's socio-economic make-up pose significant challenges to the success of the Health-Industrial Complex (CIS), as had been the case with efforts to build a domestic health-pharmaceutical sector throughout the period analysed here. These old and new challenges include the enormous difficulty of building a productive and innovative industrial sector in the broader context of continued de-industrialisation and downward technological intensity, the insufficiently stable, substantial and long-term investment on innovative activities in the real economy (due to financialisation), and the more restrictive international intellectual property regime (TRIPS) that limits technology transfer and learning-by-doing. These challenges largely affect the productive/innovative base of the CIS and its financing, whereas persistent social marginalisation and the trend towards de-universalisation of the right to health throw up additional challenges to its goal of addressing industrial, technological and social concerns in an integrated manner.

Persistent social marginalization and the de-universalisation of the right to health were compounded by the inability or unwillingness of the neodevelopmental state to address the incompatibility of the SUS financial base with the constitutional commitment to universality. As noted earlier, the constitutional earmarked share (30%) of the Social Security budget committed to healthcare has never been respected; the 'de-earmarking' mechanism regularly channeling funds from it to debt repayment has been perpetuated; the 1996 financial transaction tax collected specifically to fund healthcare, although never exclusively used for this purpose, was completely dissolved in 2007; and, no new taxes or financial instruments have been put in place to address the chronic shortfall in the sector. The result has been that federal spending on healthcare remained practically unchanged from 1995 onwards at around 1.8% of the GDP; the total *public* healthcare expenditure rose only from 3.2% in 2003 to 3.9% of GDP in 2012, constituting less than half the 8.3% average in countries with a similar commitment to universal healthcare; whereas *private* healthcare expenditure continued to be over 50% of the total, an unusually high share for a universal system (Gadelha *et al.,* 2013; Viana and Silva, 2015). Relatively low public financing of a system on which nearly 70% of Brazilians rely in a society with marked social inequality suggests that the sustainability of a universal healthcare system did not become a matter of sufficient importance to the Brazilian neodevelopmental state, despite its nominal support for universal healthcare and for the CIS. It is true that the SUS has made notable headways – e.g. the National AIDS Programme and significant improvements in vaccination, prenatal care and other basic services – but the rapid growth of the private healthcare sector seriously jeopardises the implementation of a universal system covering equally all citizens and risks marginalising the SUS to a subsystem attending predominantly to the poorer segments of society.

The chances of success for the health-industrial complex experiment are similarly not overwhelming. As is evident, despite its support for this institutional innovation, the neodevelopmental state did not reverse or address in any significant or systematic way the tendencies that had hindered the emergence of a robust health-industrial sector earlier on and its macroeconomic, social and industrial policies continued to pull in different and often contradictory directions. The only area where its contribution is marked is the level of investment in the health-pharmaceutical sector in the context of its innovation and industrial policies. Before considering this aspect, it is worth noting however that such policies remained hostage not only to the orthodox macroeconomic policy, but also to the overzealous patent law of the mid-1990s. Some amendments to it had already been introduced between 1999 and 2003, mainly to rectify some aspects of the law that

affected the domestic health-pharmaceutical sector. Importantly, the pressure for these amendments came primarily from the most successful element of SUS, the free-for-all National AIDS Programme. Its early and successful expansion, combined with the inclusion of second and third generation antiretrovirals protected unnecessarily early by patents in Brazil, generated considerable pressure on the healthcare budget which in turn made changes to the patent law acceptable (Flynn, 2013; Shadlen, 2016). Nevertheless, these changes were marginal and mainly simplified the process of issuing 'public interest' compulsory licenses, of which only one has been issued so far (2007). In other words, these minor changes had as their major effect that of enhancing the government's capacity to use the threat of compulsory licensing to obtain price reductions from *foreign* patent-holders, and not that of supporting in any significant manner the productive and technological capabilities of the domestic health-pharmaceutical sector. Indeed, lower prices negotiated in this manner did *not* substitute for the weakness of this sector; in 2007, for instance, no less than 80% of the National AIDS Programme budget went to purchase only four drugs, all benefiting from 'pipeline' patent protection (Shadlen, 2016). Perhaps the most promising proposal to reconcile patent and industrial policies reached the Brazilian Congress in December 2013 in the form of a new patent bill – *Brazil's Patent Reform: Innovation Towards National Competitiveness*[10] – but no decisive action has followed it so far. Given the particular focus afforded to pharmaceutical patents in the bill, the lack of executive action raises significant doubts about the neodevelopmental state's commitment to the CIS initiative in particular and to the co-articulation of technology, patent and industrial policies in general.

Although industrial policies did not manage to reverse de-industrialisation, the health-pharmaceutical sector overall did benefit from pharmaceuticals being singled out as a strategic sector at the very first industrial policy (PITCE 2003). Following the official launch of the CIS initiative in 2007, increased public funds were directed towards strengthening both production and innovation capacities in the health-pharmaceutical sector, primarily via the BNDES Profarma Programme to support the former and FINEP the latter.[11] This level of investment was unprecedented in the sector (Shadlen 2016) and this is perhaps one of the clearest differences between the neodevelopmental period and the ones preceding it. But, while such investment was certainly welcome, it could not have been as effective had it not been for the most promising development for the domestic pharmaceutical sector coming from an unexpected front: the creation of the new National Health Surveillance Agency (ANVISA) in 1999. Being a *regulatory* agency, ANVISA's creation was not part of an industrial policy and to this day it has no industrial or R&D goals. Nevertheless, its generic drugs policy of

1999, aiming primarily at reducing drug expenditure and *not* articulated with sectoral or industrial policies in mind, had a significant impact on the domestic pharmaceutical market. The mismatch between stringent criteria for generic market entry and the lack of local capabilities was bridged largely through BNDES' Profarma Programme which, as mentioned, following the recognition of the pharmaceutical sector as a strategic sector in the first industrial policy of 2003, channeled considerable funds towards improving the production capacities of Brazilian pharmaceutical firms (Shadlen, 2016). Offering an example of what could be achieved by co-articulated policies, as a result of this and other policies (e.g. procurement and tax incentives), the share of generics markets in Brazil grew to 17-18% of the total market at the end of the decade, of which nearly 90% was controlled by Brazilian firms (Gadelha *et al.* 2013; Caliari & Ruiz 2014). But this small victory could not by itself reverse historical trends: 48 transnational pharmaceutical companies still accounted for around 80% of the total market (by revenues) (Flynn, 2013). Unsurprisingly, the deficit in the pharmaceutical sector grew continuously, accounting regularly for nearly half of the growing healthcare sectoral deficit.

ANVISA's impact on the fortunes of the domestic pharmaceutical sector is noteworthy on another, if less celebrated, account. The same Presidential Decree that had created ANVISA in 1999, had charged it with the task of reviewing all pharmaceutical patents approved by the patent office before the patent could be granted by the latter. This so-called 'prior consent' rule and the dual-examination system it set in place from 2001 onwards, like ANVISA's generic drug policy, had no explicit industrial purpose and was aimed at limiting the patenting of incremental, 'me-too' drugs in light of the growing share of drug costs in the healthcare budget. Such examination system could not have undone the most damaging effect of the overzealous patent law, but in principle at least, the fewer pharmaceutical patents were granted due to the 'prior consent' rule, the more room domestic generic companies had to act. When the decade ended, it emerged that ANVISA had rejected only around 10% of pharmaceutical patents approved by the patent office (Shadlen 2011). Whether this rejection rate meant possibilities were created and exploited by the domestic pharmaceutical companies is difficult to assess, but the practice certainly did cause an open and long-ranging battle involving ANVISA, the patent office, foreign pharmaceutical companies, the Attorney General's Office and other government agencies, many requesting to abolish the 'prior-consent' rule as an indefensible 'forth patentability criteria' (Shadlen, 2011). These conflicts only subsided temporarily when a precarious 'workflow' between the patent office and ANVISA was arranged in 2013 according to which ANVISA would give or withhold its prior

consent on the basis of evaluating the 'health risks' of new pharmaceutical patent applications, but ambiguities and conflicts have not been entirely eliminated (Shadlen, 2016). Whatever can be said about the chances of ANVISA's role in pharmaceutical patenting surviving in the future, it is clear that conflicts over it are not merely about agency remit but throw into sharp relief both the need for and the difficulties of reconciling social, patent and industrial policies in the health-pharmaceutical sector in Brazil.

Notably, the domestic pharmaceutical sector that had grown thanks to some of the measures discussed did not unequivocally support the 'prior consent' rule as conflicts unfolded (Reis *et al.* 2009). Indeed, a new group (*Grupo Farma Brasil*, GFB) that had been created in 2012 to represent some of the largest domestic pharmaceutical companies that grew during this period – e.g. EMS Corps, Hypermarcas, Aché, Libbs and Eurofarma – actually opposed it on account of it being too restrictive (Shadlen 2016). Presumably, this position was based on the assumption that as these companies started to move towards innovation, it would most likely be of the incremental type that could fall prey to the prior consent mechanism. That these companies aim to join the patent game where revenues are much higher is not surprising; besides, the state support for the sector from the first industrial policy in 2003 onwards had also been justified on account of transforming the sector into an innovative and competitive one. As noted earlier, funding for the sector increased following the official launch of the CIS experiment in 2007 and was directed towards strengthening both production and innovation capacities. Indeed, funding for innovation projects exceeded funding directed towards enhancing productive capacities for the first time in 2011 (Shadlen 2016: 233). Whether this will lead to genuine innovative capacities within the domestic sector remains to be seen; data suggest that GFB members have increased their R&D intensity, although it remains low by international standards (GFB, 2014). Another factor that may hinder the entry of Brazilian pharmaceutical companies into the patent game is the ever-present risk of being acquired by foreign proprietary companies; in the absence of controls over foreign ownership in the health-pharmaceutical sector, some emerging domestic companies have already been acquired by foreign companies (Caliari and Ruiz, 2014; Viana and Silva, 2015).

As an old saying goes, those who have knowledge, do not predict.[12] It would be impossible to tell with any certainty how an initiative as recent as the health-industrial complex would fare in Brazil. Still, if history is a guide, a guess can be hazarded. As discussed, this initiative emerged and gained official support by the neodevelopmental state which, while investing considerably in the health-pharmaceutical sector, did not

succeed in overcoming Brazil's 'marginalization-modernisation' polarity or addressing in any systematic way the persistent misarticulation of social, macroeconomic, industrial and patent policies that had thwarted the establishment of a robust health-pharmaceutical sector in Brazil earlier on. In addition, new challenges to the health-industrial complex are likely to emerge from other fronts. Although the new government that followed the impeachment President Rousseff has not made any policy announcement regarding the CIS experiment to date, its fiscal and state entrenchment plans would certainly jeopardise the already insufficient support for the healthcare system and the necessary investment levels in the productive and innovative capabilities of the pharmaceutical sector. Should it also mark the end to the hybrid, neodevelopmental state orientation of the last 13 years – as it appears likely – the institutional innovation that the CIS represents will likely come to be seen as yet another step in a series of interrupted efforts to construct a robust healthcare sector in Brazil.

Concluding thoughts

Brazil boasts a number of successful domestic high-tech sectors, most notably petrochemicals and agricultural research. Up until the rise of the hybrid, neodevelopmental state in the mid-2000s, the success of these sectors remained largely localised. The inability of these localised successes to generate enough forward and backward linkages to push Brazil towards overall technological autonomy can be explained by its broader socio-economic development trajectory remaining conditioned by what Furtado referred to as 'marginalisation-modernisation' polarity. The bulk of the analysis offered here aimed to show how this persistent polarity generated inconsistent and contradictory technological, industrial and social policies that hampered the chances of building a dynamic, domestic health-pharmaceutical sector. The rise of the neodevelopmental state offered hopes of bringing about a significant transformation of Brazil's socio-economic structures by placing social equity and cohesion at the core of both social and economic policies. Aiming to simultaneously rectify social inequality (in health), dependency on foreign technology and weaknesses in Brazil's innovation and productive structures, the Health-Industrial Complex launched officially in 2007 represents the emblematic neodevelopmental institutional innovation. Its success is intrinsically linked to the success of Brazil's neodevelopmental model in overcoming the 'marginalisation-modernisation' polarity through simultaneously addressing its persistent high income concentration and creating dynamic productive and innovative centres domestically. So far, the record of the hybrid, neodevelopmental model has been one of considerable resource transfer to the financial sector, at the expense of both productive sectors and of social policy. Because it can neither be understood nor achieved as a sectoral policy in isolation, it is only when the construction of Brazil's productive structures aimed at serving the needs of its society comes to orient and coordinate state policies that the Health-Industrial Complex, or a future version of it, can succeed.

Notes

[1]This term is used throughout to refer to the pharmaceutical manufacturing sector overall (active ingredients and finished products), as well as that related to diagnostics, equipment, vaccines, blood derivatives, materials etc. It is a significant part of the heath-industrial complex, which also includes healthcare infrastructure and services.

[2] Data about the informal economy are by definition debatable; according to Power and Roberts (2010) informal economy was still very large by the early 1990s, constituting over half of the national workforce, whereas the ILO (2009) reported that the informal sector had grown from 54% in 1992 to 56% in 2002.

[3] CIS is the acronym in Portugese (*Complexo Industrial da Saúde*), adopted here in line with its use in the relevant literature and official documents in Brazil.

[4] The initial official formulations of neostructuralism can be found in ECLAC (1990) *Changing Production Patterns with Social Equity*, and ECLAC (1992) *Social Equity and Changing Production Patterns: An Integrated Approach.*

[5] This body of work (not discussed here specifically) emerged and grew with the publication of the edited book by Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch, *The Social Construction of Technological Systems* (Massachusetts: MIT Press, 1987).

[6] Industrial Property Law (Lei nº 9.279) 14 May 1996.

[7] Because TRIPS standards regarding pharmaceutical patents represented a radical break with existing international practices, it was agreed – at developing countries' insistence – that a staggered implementation of TRIPS standards in this sector would be rolled out.

[8] During the May 1996 – May 1997 window for submission of 'pipeline' patents in Brazil, holders of patents granted outside Brazil pre-1995 (but not yet marketed) could also request patent protection in Brazil.

[9] Effectively meaning that the failure to work locally a patent could lead to its annulment. This provision has traditionally been used to encourage local working as a means of learning and technological upgrading.

[10] Projeto de Lei n° 5.402/2013, *A Revisão da Lei de Patentes: Inovação Em Prol da Competitividade Nacional*, available at http://bd.camara.gov.br/bd/handle/bdcamara/14796.

[11] FINEP is the Brazilian Agency for Innovation and Research.

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[12] Attributed to Lao Tzu, 6th century B.C.